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GEOLOGY AND PALÆONTOLOGY.

THE MAMMALIAN GENUS *HEMIGANUS*.—This genus was characterized by me in the *NATURALIST* for 1882, p. 831,¹ from a number of teeth. The typical species, *H. vultuosus* was supposed to be a beast of about the size of a tapir. Its exact position was not determined. Jaws with teeth and a part of the skeleton of a second and smaller species of the genus recently received, throw much light on its characters, and demonstrate that it is one of the most remarkable of the Eocene Mammalia yet discovered.

The claws are large and compressed like those of a prehensile-footed carnivore. The astragalo-tibial articulation is nearly flat. The femur is very robust, and has a low third trochanter, as in *Bunotheria* generally. The vertebræ of the neck are short and wide. The jaws have a very large and wide coronoid process, as in *Calamodon*, and the horizontal rami are very robust. The molar teeth of the lower jaw have but one root. Only one true molar (the first) is preserved, and it has the crown worn. Its outline is sub-round, with a notch on the internal side. There are probably four premolars, and their crowns are short, obtuse cones, with a low heel-like expansion at the inner side of the posterior base. They resemble very nearly the teeth of some of the eared seals. There is a robust canine tooth in the upper jaw, which is not separated from the premolars by a diastema. There is at least one superior incisor, but the exact number is unknown. There is a large tooth on each side of the symphysis of the lower jaw, but in the specimens it is not in place. It has enamel on the anterior face only, and its apex is worn transversely. The wear descending passes to one side of the middle line. It evidently has a median position, and may therefore be an incisor. Its form reminds one of that of the second inferior incisor of *Calamodon*, but the enamel-face is much shorter.

Should the large inferior teeth be canines, the mandibular dentition will greatly resemble that of the seals, as does that of the maxillary bone. The absence of postorbital angles resembles the condition in the *Phocidæ*. The wide vertical coronoid process and the flat vertical angle are as in *Calamodon*. The sagittal crest is elevated, and the brain-case very small.

Hemiganus may for the present be referred to the *Creodonta* where it will stand quite alone, and next to the *Tæniodonta*.

The species which is represented by the specimens referred to; may be called *Hemiganus otariidens*. It may be characterized as follows: Enamel of teeth everywhere smooth. Posterior true molars smaller than the anterior. Diameter of crown of M. 1: transverse .008; anteroposterior .008. Diameter of large inferior ? incisor at shoulder: anteroposterior .017; transverse .008. Depth of ramus at P-m. III .040; at coronoid process .090; length

¹ It is figured on Plate XXIII c, figs. 7-12, Report U. S. Geol. Survey Terrs., III.

of ramus posterior to P-m. III inclusive .106. From the lowest beds of the Puerco epoch. D. Baldwin.—*E. D. Cope*.

MARSUPIALS FROM THE LOWER EOCENE OF NEW MEXICO.—Two families undoubtedly referable to the Marsupialia have been identified from the Puerco Eocene, the Polymastodontidæ and Plagi-aulacidæ (see NATURALIST, 1884, p. 686, for an account of these animals). One genus of each is known, viz., Polymastodon and Ptilodus. I now add a third genus in the Neoplagiaulax of Lemoine, which belongs to the Plagiaulacidæ, and has been represented hitherto by a single species from the Puerco beds of Rheims, France. The American species is very distinct from the European, and comes from the base of the formation in New Mexico. I describe it as follows:

Neoplagiaulax americanus.—Size a little exceeding that of the *Ptilodus mediævus*, and many times larger than the *N. eocænus* Lemoine. The large fourth premolar is less elevated than in the two species mentioned. Its cutting edge is obtusely serrate, and the lateral keels though fine, as in *P. mediævus*, are only seven in number instead of twelve. The posterior base wears into a little truncation. The molars are much as in the species named. The tubercles are coarse and number four on each side on the first, and two on each side on the second. The incisor is much compressed, and the enamel band is perfectly smooth. The coronoid process rises opposite the second tubercle of the first true molar. Measurements: Length of base of P-m. IV .012; elevation of crown of do. .006; length of bases of molars .009; of first true molar .006. Depth of ramus at middle of P-m. IV .011; at diastema .008. Depth of incisor at middle .006; width of do. at do. .003. D. Baldwin.

Ptilodus trovessartianus Cope, Report U. S. Geol. Survey Terrs., III, p. 737, Pl. xxv f, Fig. 19.—Two mandibles of this species, found by Mr. Baldwin, are in excellent preservation, including both the two premolars and the two true molars, and showing that the species belongs to Ptilodus rather than to Neoplagiaulax. Besides its inferior size, this species differs from the *P. mediævus* in the smaller second true molar. The tubercles of this tooth are two on each side; in the *P. mediævus* they are four on one side and two on the other. It comes from the middle horizon of the Puerco.

Polymastodon taoënsis Cope: *Tæniolabis scalper* Cope, Report U. S. Geol. Surv. Terrs., III, p. 193, Pl. xxiii d, Fig. 7.—The genus Polymastodon is found in the lowest horizon of the Puerco in abundance, but is rare, if present, elsewhere in the formation. Specimens of the species above mentioned include incisors of the kind which furnished the typical description of the *Tæniolabis scalper*, with superior molars of this genus, and probably of the species *P. taoënsis*, of which several undoubted specimens were

found by Mr. Baldwin at the same locality. *T. scalper* was probably founded on superior incisors of *P. taoënsis*.

Polymastodon attenuatus, sp. nov.—This form is represented by a mandibular ramus with entire dentition, of one individual, and by a superior incisor with portions of inferior molars of a second. The specific character is seen in the very compressed incisors and general lightness of structure of the ramus, in which it is quite different from the species of similar size, the *P. taoënsis* and *P. latimolis* (NATURALIST, April, 1885). The tubercles and proportions of the true molars are as in *P. taoënsis*. The apex of the fourth premolar is transversely fissured. The superior incisor is much more compressed than in that of *P. taoënsis*, and is more rapidly acuminate in its form, to the subacute apex. There are no facets of the internal side as in that species. The enamel covers almost the entire external face, and is marked by rather coarse parallel grooves. A groove runs along the concave edge of the crown, forming the edge of the enamel excepting for its distal half, where the enamel crosses it, and covers the internal side for its distal fourth. The inferior incisor is also much compressed so that the enamel is presented externally rather than anteriorly, and its cutting edge is nearly anteroposterior and not transverse, as in *P. taoënsis*. Its surface is obsoletely grooved. Length of superior incisor .25; diameters do. at middle: anteroposterior .013; transverse .006. Length of inferior true molars .032; depth of ramus at middle M. i. .034.—*E. D. Cope*.

THE LOUP FORK MIOCENE IN MEXICO.—A considerable extent of tertiary deposit in the State of Hidalgo and the adjoining parts of Vera Cruz has been announced by Professor Antonio de Castillo in the report of the School of Mines of Mexico for 1883. I recently visited the region, and obtained from the beds bones and teeth belonging to species of *Prothippus*, *Hippotherium* and *Mastodon*, and probably *Procamelus*; and Professor Castillo has teeth of *Dicotyles*. It is thus evident that the horizon is the Loup Fork or Upper Miocene of the North American series. This is by far the most southern exhibition of this formation, the nearest locality which I have identified with it being in New Mexico. In its Mexican area it occupies a tract of at least eighteen miles by six, which at present presents an extremely irregular surface. It is excavated into numerous valleys of erosion by tributaries of the Tuxpan and Benados rivers, some of which are fifteen hundred feet in depth and quite narrow. The axes of the high lands consist of trap, which in some instances are dykes, as the limestones of palæozoic or mesozoic age lie against them inclined at high angles. Some of these traps inclose masses of obsidian of various sizes. The entire Loup Fork formation is now not less than two thousand feet in thickness, as it not only fills the valleys but also caps the traps. Several thin beds of coal occur in it, both above and below the escarpments of trap; in the latter case

frequently dipping at a low angle towards the trap. Between the coal beds are shales apparently composed of volcanic ash, and beds of excellent clay. The country is covered with vegetation ranging from that of the *Tierra fria*, with pines, oaks, Liquidambar, Platanus, Alnus, Negundo, etc., to the moderate *Tierra caliente*, with oranges, Zamias, Cereus, etc. The fossils are only found in making artificial excavations.—*E. D. Cope.*

DISCOVERY OF AN EXTINCT ELK IN THE QUATERNARY OF NEW JERSEY—Professor William B. Scott, of Princeton, made (reports *Science*) a communication on an extinct elk, a skeleton of which was recently found in the quaternary of New Jersey. The bones, which are in a state of remarkable preservation, were dug from a bog near Mount Hermon. They were at first supposed to belong to a moose, but, on further examination, it was seen that the skeleton was that of a remarkable form of deer-like animal, between the genera Cervus and Alces, and the name Cervalces was therefore proposed for it. Among other peculiarities, the animal was characterized by long legs and short neck, indicating that it was fitted to progress rapidly through the snow, and that it was not a grazing animal, but obtained its food by browsing on trees as does the moose. Its long nasal bones, however, indicated that it was not provided with the long, fleshy lips of the moose, which amounts almost to a proboscis, and that it was therefore at a comparative disadvantage in gathering its nourishment from the branches of trees. The antlers of the specimen are still in the velvet, indicating that the individual probably died in September. They are provided with curious scoop-shaped processes at the base, which, when the head was lowered, must have actually obscured lateral vision. The use of these processes, the presence of which to all appearances was simply a disadvantage to the animal, cannot be determined. The form is peculiarly interesting as illustrating at least one link between two markedly divergent genera, and as suggesting their line of descent. The speaker dwelt at length on the adaptations of structure to surroundings, and gave in detail the diagnostic characters of Alces, Cervus and Cervalces. His remarks were illustrated by photographs and diagrams.

TERTIARY MAN AT THENAY.—The most interesting question brought before the geological section of the French Association was the existence of man in the tertiary epoch. In 1867 the Abbé Bourgeois found at Thenay (Loir et Cher) some flints which he believed to be worked by man or split by fire. Extensive excavations were made at Thenay, which is about twenty kilometers from Blois, and forty members of the Association repaired thither to examine the locality. Comparison with the surrounding strata showed that the bed (of greenish clay mixed with small flints) in which the presumably worked flints occurred, was an upper

stratum of the argillaceous flint-bed which everywhere underlies the Beauce limestone, and therefore is early miocene or even eocene. Only two flints were found which bore the apparent impress of human handiwork, but the splitting which has been attributed to fire, was more common. The great majority of the members concluded that, considering the enormous extent of the beds, the rarity of the peculiar flints found and their unknown use, and the possibility that the effects, like those of fire, were produced by some unknown natural cause, there was nothing to warrant a belief in the existence of man at so remote a period.

A map of the environs of Blois constructed for the geological map of France, and presented to the Association, shows that the Beauce limestone was deposited in a lake, while the clay, with flints, passes beneath the limestone and forms the borders of the lake.

GEOLOGICAL NOTES.—*General*.—It appears from Dr. R. D. M. Verbeek's atlas and description of Sumatra, between $0^{\circ} 14''$ and 1° S. lat. and $99^{\circ} 45'$ and $101^{\circ} 25'$ E. long., that productive coal is wanting in the explored district, and that mesozoic beds are also lacking. The Eocene lies upon the Carboniferous, and the newer Tertiary strata appear to be wanting in the same area. The conclusions arrived at concerning the geology of the island, are that at the end of the Eocene or beginning of the Miocene, an eruption of andesite from fissures occurred in Sumatra, Java and Borneo, contemporaneous with the uplifting of the highlands of Padang. In Bencoolen, Lower Miocene beds overlie this andesite, and at the same spot Middle and Upper Miocene and Pliocene strata also occur. The Pliocene marl shows no trace of newer eruptive materials, while the overlying Quaternary consists of clay and andesite material. In Java, also, the Eocene strata are broken through by andesites and basalts, and the probably Miocene strata which overlie the orbitoides limestone contain andesite materials. The great craters are more modern than the fissure-poured andesite, and between them intervened a period of comparative calm. The commencement of the activity of these volcanoes cannot be fixed with certainty, but was probably nearly quite at the end of the Tertiary period.

Carboniferous.—M. Dieulafait has conducted a series of experiments upon recent Equisetaceæ, with a view to ascertain the reason why coal is always impregnated with sulphur, and why coal ashes do not contain free carbonates of the alkalis, such as were general in the ashes of recent plants. He finds that modern Equisetaceæ contain a proportion of sulphuric acid very much in excess of that contained by other recent plants, and arrives at the conclusion that, as the flora of the Coal Measures was largely composed of Equisetaceæ, it is to them that the great quantity of sulphur and sulphate of lime is due. The absence of

alkaline carbonates in the ashes of coal is a natural consequence of the excess of sulphate of lime always present in the ashes.—Johann Kusta describes *Anthracemartus krejci*, a new Arachnid from the Carboniferous of Bohemia. H. B. Genitz describes *Krerscheria*, a pseudo-scorpion.

Permian.—An impression of a terrestrial shell (*Dendropupa walchiarum* Fischer) has been found in the Permian beds of Saone et Loire. This is the only terrestrial mollusk of Carboniferous age that has yet been found on the European continent. *Dendropupa vetusta* was described in 1853 by Dawson, from trunks of *Sigillaria* in Nova Scotia, and several other Devonian and Carboniferous pulmonates have since been found in America.

Tertiary.—Johann Kusta enumerates three species of *Hyopotamus* and two of *Anthracotherium* from the Hempstead beds of the Isle of Wight.—W. Davies has verified the occurrence of *Hyaenarctos* in the Miocene strata of Pikermi near Athens.—W. Davies (*Geol. Mag.*, Oct., 1884) describes *Viverra hastingiae* and remains of two other carnivores from the Eocene fresh-water beds of Hordwell, Hampshire.—J. S. Gardiner describes (*Geol. Mag.*, Dec.) six species of *Aporrhais*, all belonging to an ancestral type of the recent *A. pes-pelecani*, from the Eocene of Great Britain.—R. Lydekker describes a new species of *Merycopotamus* (*M. nanus*), from examples in the British museum.

Quaternary.—Entire skeletons of the cave hyæna are rare, for these animals devoured the bones of their own as well as of other species. Recently M. F. Regnault, of Toulouse, has descended into a cavity twenty meters deep in the grotto of Gargas, Hautes Pyrenees, and has found entire skeletons of hyænas, bears and wolves, the position being such that the hyænas could not get at the bones to devour them. From examination of these bones, M. Alb. Gaudry believes that *H. spelæa* is but a variety of *H. crocuta*.

MINERALOGY AND PETROGRAPHY.¹

WADSWORTH'S LITHOLOGICAL STUDIES, PART I.²—This handsomely printed quarto volume of over two hundred pages and many colored plates, at first glance promises, both from its title and general scope, to be a most valuable addition to the literature of petrography; nevertheless a careful study of its contents fails to discover as much that is new and useful as was at first expected. The work aims to be an exhaustive and critical revision of all the petrographical work hitherto accomplished as well as an attempt to rearrange the same in accordance with the author's

¹ Edited by Dr. GEO. H. WILLIAMS, of the Johns Hopkins University, Baltimore, Md.

² Lithological Studies, Part I. A description and classification of the rocks of the Cordilleras. By M. E. Wadsworth. 4to, with 8 colored plates. Memoirs of the Museum of Comp. Zoölogy at Harvard College, Vol. IX, Oct., 1884.